

REMARKS

After the foregoing amendment, claims 1-67 are pending in the application. Claims 1, 3-10 and 15-21 have been amended. Claims 25-67 are new. Support for the amendment to claim 1 is shown at Figs. 1-3 and described at page 1, line 1 to page 2, line 15, pages 11-18 and page 53, lines 1-4 of the originally filed application.

Rejection - 35 U.S.C. § 102

The Examiner rejected claims 1-9, 11-13 and 24 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent Application Publication No. 2003/0194589 A1 ("Pratt"). Applicants respectfully traverse the rejection.

Patentability of claims 1-9, 11-13 and 24 over Pratt

Pratt

Pratt is directed to a method and apparatus for considering and balancing the power characteristics of a fuel cell system, the dynamic load requirements of an electronic device and the usage profile of one or more user's for use of the fuel cell system as a power source. As described at paragraph [0035] and shown in Fig. 4, Pratt stores dynamic load patterns of a connected load device and usage patterns of the load device. Pratt uses this information to determine the operational settings, i.e. operating point (step 440) for the fuel cell device. As described by Pratt et al. at paragraph [0023], the operating point to which Pratt's invention is directed includes: (a) selecting the current voltage output relation, (b) controlling the stoichiometry and rate of oxidant flow, (c) managing the hydration level, product water generation and the purging cycle, (d) varying the amount of fuel and oxidant and (e) varying the characteristics of auxiliary systems.

The Present Invention

As described at page 2, lines 9-15 of the application, an embodiment of the present invention is directed to the problem of determining when to start up a fuel cell for providing power to a load in consideration of the energy required to increasing the temperature of the various components of the fuel cell in order to start up the fuel cell. Where the start-up and stopping of the fuel cell would take place frequently, the amount of energy required to start up

the fuel cell may affect whether or not to use the fuel compared to using an alternate power supply.

Claim 1

Pratt does not disclose, teach or suggest an operation control means configured to decide scheduled start-up time of said fuel cell based on the load value data predicted by said load value predicting means as recited in Amended claim 1.

Claim 1, as amended recites:

1. *A fuel cell system comprising:*

a fuel cell;

a load value detecting means configured to detect a load value of a load of electric power or heat which is generated by equipment supplied with the electric power or the heat from said fuel cell system;

a load value storage means configured to store a history of the load value detected by said load value detecting means;

a load value predicting means configured to predict a load value which is going to be generated based on the history of the load value and to store the predicted load value as load value data; and

an operation control means configured to decide scheduled start-up time of said fuel cell based on the load value data predicted by said load value predicting means.

Claim 1 recites, *inter alia*, an operation control means configured to decide scheduled start-up time of said fuel cell based on the load value data predicted by said load value predicting means.

"Both before and after Donaldson, the application of a prior art reference to a means or step plus function limitation requires that the prior art element perform the identical function specified in the claim."

(See MPEP 2182.)

Applicants submit that the aforementioned limitation is a means-plus-function limitation. The aforementioned limitation is in means-plus function form because: (1) the claim language is written as a function to be performed, (2) the means language is modified by functional

language, and (3) the means language is not modified by sufficient structure, material or acts for achieving the specified function (See MPEP 2181, Part I).

Pratt is directed to setting an initial operating point of a fuel cell to conform to the dynamic load requirements and historical usage of a device, and continues to adjust the operating point of the fuel cell in accordance with real time data. (paragraph [0019]). Pratt does not disclose the claimed function of deciding the start-up time of the fuel cell based on the load value predicted by the load predicting means and therefore does not perform the identical function as that recited in amended claim 1. Accordingly, Applicants respectfully request reconsideration and withdrawal of the § 102 rejection of claim 1.

Claim 3

Pratt does not disclose, teach or suggest calculating the amount of primary energy supplied by the fuel cell and the primary energy provided by a separate power system in order to determine the start time of the fuel cell as recited by amended claim 3.

Amended claim 3 recites, *inter alia*,:

...said calculating means calculates the amount of primary energy based on the power value data for a predetermined time period, for a case where said fuel cell supplies the electric power and for a case where a power system separate from the fuel cell supplies the electric power, and said operation control means compares values calculated by said calculating means and decides start time of the time period as the scheduled start-up time when the value calculated for the case where said power system supplies the electric power is larger than the value calculated for the case where said fuel cell supplies the electric power..

The Examiner asserts that Pratt calculates an amount of primary energy based on power value data for the case where the fuel cell system 130 supplies electric power and the case where the power system 100 provides electric power. The Examiner further asserts that Pratt discloses deciding the start up time is the scheduled start-up time when the power system supplies calculated electric power larger than the calculated fuel cell power. Applicants respectfully disagree.

Pratt is directed to determining an operating point of the a fuel cell power source 100 based on the dynamic load pattern of a load device and the usage profile of the load device by various users. The fuel cell power source 100 disclosed in Pratt et al. includes a fuel cell system 130 and peripheral devices (fuel storage container 110, control means 150, information storage device 140, etc) for operating the fuel cell system 130 (paragraph [0016]). That is, the fuel cell power source 100 is identical to the fuel cell system 130 as an electric power source.

As described at pages 1-2 of the application, an embodiment of the present invention is directed to determining whether to supply electric power to a power load 14 from a fuel cell 13 or to supply the power from an external power system.

The claimed invention determines that the start time of the fuel cell is the scheduled start time when the primary energy predicted to be supplied by the power system is greater than the primary energy predicted to be supplied by the fuel cell.

In contrast to the teachings of Pratt, the power system recited in claim 3 supplies electric power from a power system company including power generation equipment via power transmission equipment which is separate from the claimed fuel cell (see page 53 lines 1-4 of the application).

Pratt merely uses the dynamic load data and usage profile of the load device to determine an operating point of the fuel cell. Such operating point disclosed by Pratt et al. does not include a start time of the fuel cell but merely the parameters of the fuel cell while it is operating.

Pratt fails to disclose a calculating means that calculates a primary energy for the case where the power system external to the fuel cell system supplies electric power and an operation control means that compares a calculated value of the primary energy for the case where the fuel cell supplies electric power to calculated value of the primary energy for the case where the power system supplies the electric power and decides scheduled start-up time in a predetermined time period.

For the above reasons, Applicants respectfully request reconsideration and withdrawal of the § 102 rejection of claim 3.

Claim 4

Pratt does not teach suggest or disclose a calculating means which considers the amount of energy consumed to start up the fuel cell, as recited in claim 4.

Pratt in paragraph [0034] discloses using information about the power characteristics of the fuel cell system, the dynamic load requirements of the load device, the pattern of usage of the device user, and the remaining quantity of fuel in the fuel storage container, power capacity remaining in the fuel cell power source, the amount of time the load device could be operated in different modes, etc.

All of the information identified by Pratt relates to properties of the load device and the fuel cell. None of this information allows for the determining the primary power that is consumed to start up the fuel cell, i.e. power required to heat the various components of the fuel cell system, as recited in claim 4.

For the above reasons, Applicants respectfully request reconsideration and withdrawal of the § 102 rejection of claim 4.

Claim 6

Pratt does not disclose teach or suggest a fuel generator as recited in amended claim 6.

The fuel storage container 110 of Pratt et al. is a container for storing the fuel (paragraph [0016]). Claim 6 recites a fuel generator configured to generate a fuel containing hydrogen from a material. Pratt merely describes a container for storing fuel and not for generating fuel. Therefore, Pratt et al. fails to disclose the fuel generator of claim 6. Accordingly, Applicants respectfully request reconsideration and withdrawal of the § 102 rejection of claim 6.

Claims 2-9, 11-13 and 24

Applicants further submit that claims 2-9, 11-13 and 24 are patentable over Pratt at least by their dependency from allowable claim 1.

Rejection - 35 U.S.C. § 102

The Examiner rejected claims 1-4, 6, 8, 10, 14-16, 18, 20, and 22-24 under 35 U.S.C. § 102(b) as being anticipated by Japanese Patent No. JP 2002-190308 ("Yamashita").

Yamashita

Yamashita discloses continuously computing: (1) the power consumed by the electric load 400 for the past minute (paragraph [0055]), (2) a cost of power for providing the electric load (i.e. covering the electric load) had it been purchased from an electric power company

(paragraph [0057]), and (3) a cost of power for the electric load had it been generated by a fuel cell (paragraph [0076]). The cost (Ce) for the past 1 minute in the case of covering the power by purchase from the electric power company is compared to the cost (Cg) for the past 1 minute in the case of covering the power by the fuel cell. Switching to the power of cheaper cost occurs each time the cost Ce is compared with the cost Cg .

Patentability of Claims 1-4, 6, 8, 10, 14-16, 18, 20, and 22-24 over Yamashita

Claim 1

Claim 1, as amended recites:

1. *A fuel cell system comprising:
a fuel cell;
a load value detecting means configured to detect a load value of a load of electric power or heat which is generated by equipment supplied with the electric power or the heat from said fuel cell system;
a load value storage means configured to store a history of the load value detected by said load value detecting means;
a load value predicting means configured to predict a load value which is going to be generated based on the history of the load value and to store the predicted load value as load value data; and
an operation control means configured to decide scheduled start-up time of said fuel cell based on the load value data predicted by said load value predicting means.*

1. Yamashita does not disclose, teach or suggest a load value predicting means configured to predict a load value which is going to be generated based on a history of the load value as recited by amended claim 1.

Yamashita discloses a process that selects a source of power for the next minute based on past power data. Implicit in the success of this process is that the load value does not change from the past minute to the present minute, since it is the past minute of load that controls the decision. In contrast to Yamashita, claim 1 recites a load value predicting means which is

configured to predict a load value which is going to be generated based on the history of the load value, and to store the predicted load value.

2. Yamashita does not disclose, teach or suggest an operation control means configured to decide a scheduled start-up time of the fuel cell based on the predicted load value as recited by amended claim 1.

(1). Since Yamashita fails to disclose the load value predicting means as described above, Yamashita et al. fails to disclose the operation control means configured to decide scheduled start-up time of the fuel cell based on the load value data predicted by the load value predicting means.

(2). It is true that Yamashita et al. discloses that start-up of the fuel cell is started when it is decided that the power is supplied from the fuel cell (paragraph [0139]-[0142], Figure 8). However, this merely means that the start-up of the fuel cell is started at the time of the decision. This is quite different from the fact that the operation control means decides a scheduled start-up time in advance within the fuel cell system.

Yamashita does not decide a scheduled time for starting up a fuel cell but merely starts the fuel cell at the instant that a comparison of the past power system covering power and the past fuel cell covering power is completed. Thus, Yamashita et al. fails to disclose the claimed operation control means configured to decide the scheduled start-up time.

Claim 4

Yamashita does not disclose, teach or suggest calculating the primary energy consumed to start-up the fuel cell, as recited by amended claim 4.

Yamashita et al. discloses a computing method of a cost in the case of covering power used in electric load for the past 1 minute by the fuel cell using a city gas (paragraphs [0061] - [0079]). Yamashita et al. discloses computing the cost of the city gas consumed by power generation of the fuel cell for the past 1 minute. Yamashita fails to disclose computing the cost used to start-up of the fuel cell prior to start of power generation .

Claim 6

Yamashita does not disclose, teach or suggest calculating the amount of primary energy consumed to supply electric power from the fuel cell considering the amount of primary power used to start up the fuel cell, as recited by amended claim 6.

Yamashita computes the cost of the gas consumed by the fuel cell to cover the power used in the electric load for the past one minute. However, Yamashita does not disclose teach or suggest computing the cost of the gas consumed to start up the fuel cell prior to the start of power generation by the fuel cell.

Claims 2-4, 6, 8, 10, 14-16, 18, 20 and 22-24

Applicants further submit that claims 2-4, 6, 8, 10, 14-16, 18, 20 and 22-24 are patentable over Yamashita at least by their dependency from allowable claim 1.

Rejection 35 U.S.C. § 103

The Examiner rejected claims 17, 19 and 21 under 35 U.S.C. § 103(a) as being unpatentable over Japanese Patent No. 2002-190308 ("Yamashita"), as applied to claims 1-4, 6, 8, 10, 14-16, 18, 20, and 22-24 above and further in view of U.S. Patent Application Publication No. 2003/0194589 A1 ("Pratt"). Applicants respectfully traverse the rejection.

Neither Pratt nor Yamashita disclose, teach or suggest a load value predicting means configured to predict a load value which is going to be generated based on a history of the load value as recited by amended claim 1. Accordingly, the combination of Pratt and Yamashita does not overcome the deficiency of Pratt and Yamashita taken alone. Thus claims 17, 19 and 21 are allowable based at least on their dependency from allowable claim 1.

New claims 25-67

New claims 25-59 are allowable based at least on their dependency from allowable claim 1. Claim 60 is allowable for the same reasons that claim 1 is allowable. Claims 61-67 are allowable based at least on their dependency from allowable claim 60.

Conclusion

Insofar as the Examiner's objections and rejections have been fully addressed, the instant application, including claims 1-67, is in condition for allowance and Notice of Allowability of claims 1-67 is therefore earnestly solicited.

Respectfully submitted,

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